

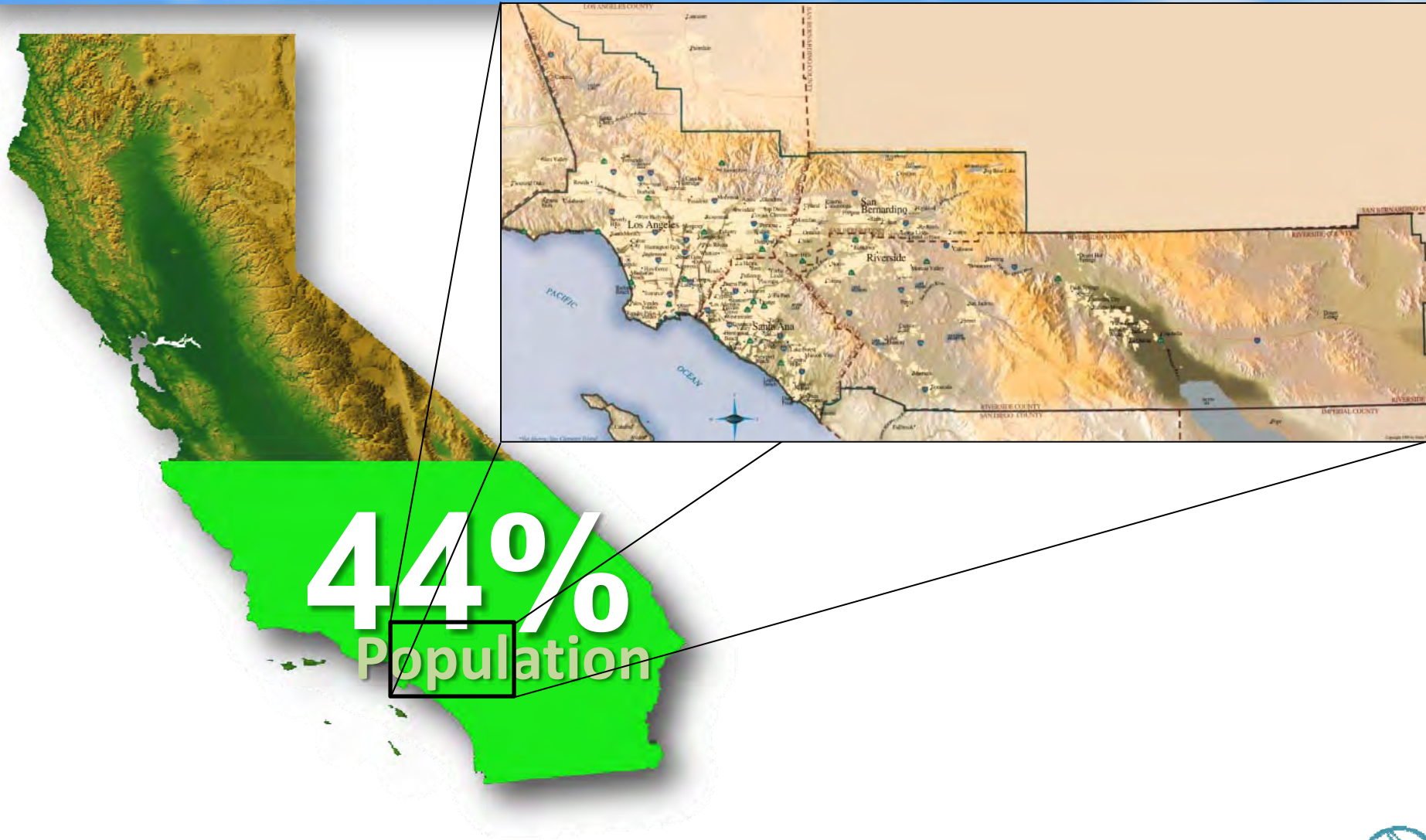


Transforming Transportation: the Air Quality Need for Zero & Near-Zero Emission Technologies

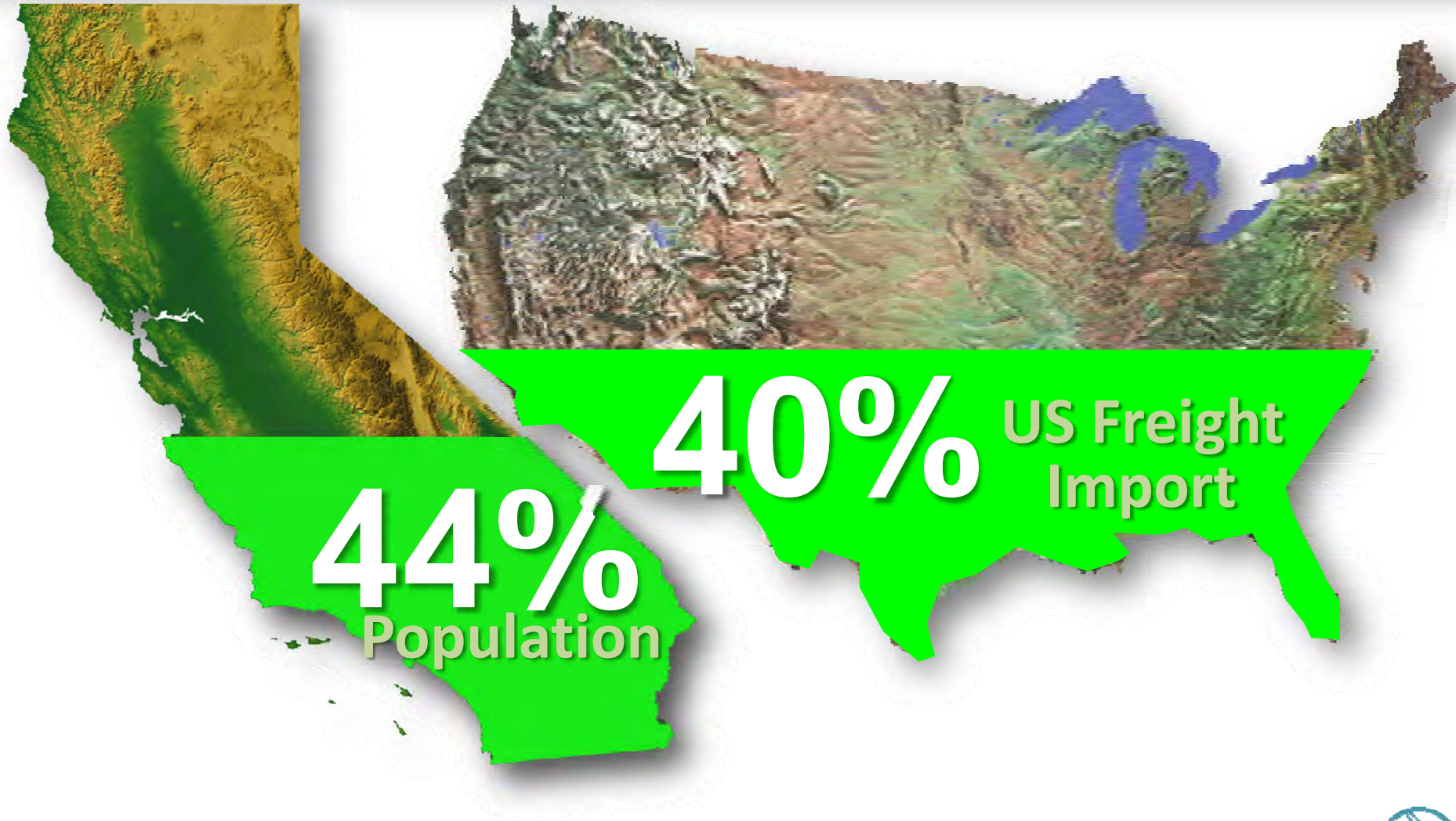


Matt Miyasato, Ph.D.
Deputy Executive Officer
Science & Technology Advancement

South Coast Air Basin



South Coast Air Basin



South Coast Basin

17 million residents

6th largest cargo gateway

+10 million passenger cars

+1.5 million heavy-duty trucks



Daily Peak Combined AQI

Saturday, June 29, 2013



Good

Moderate

USG

Unhealthy

Very
Unhealthy

Hazardous



+5,000 deaths
year

Additional costs include

- Hospitalizations
- Cases respiratory illness
- School absences
- Lost workdays

\$ Billions

New research shows how air pollution can make you bad at math

BY CHRISTOPHER INGRAHAM  March 10

In 2011 researchers at UC San Diego [demonstrated](#) a link between air pollution and the math abilities of agricultural workers. Now those 1

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News & Features

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Energy & Sustainability :: News :: July 26, 2010

Urban Air Pollution Linked to Lower IQs before Baby's First Breath

A study in Krakow, Poland, corroborates New York City findings that link children's lower IQ scores with mothers' exposure to compounds created by burning fossil fuels

By Marla Cone, Emily Elert and Environmental Health News

Air pollution lowers sperm quality

BY CHRISTOPHER DOYLE

ABC Environment | 25 FEB 2014

 Comments

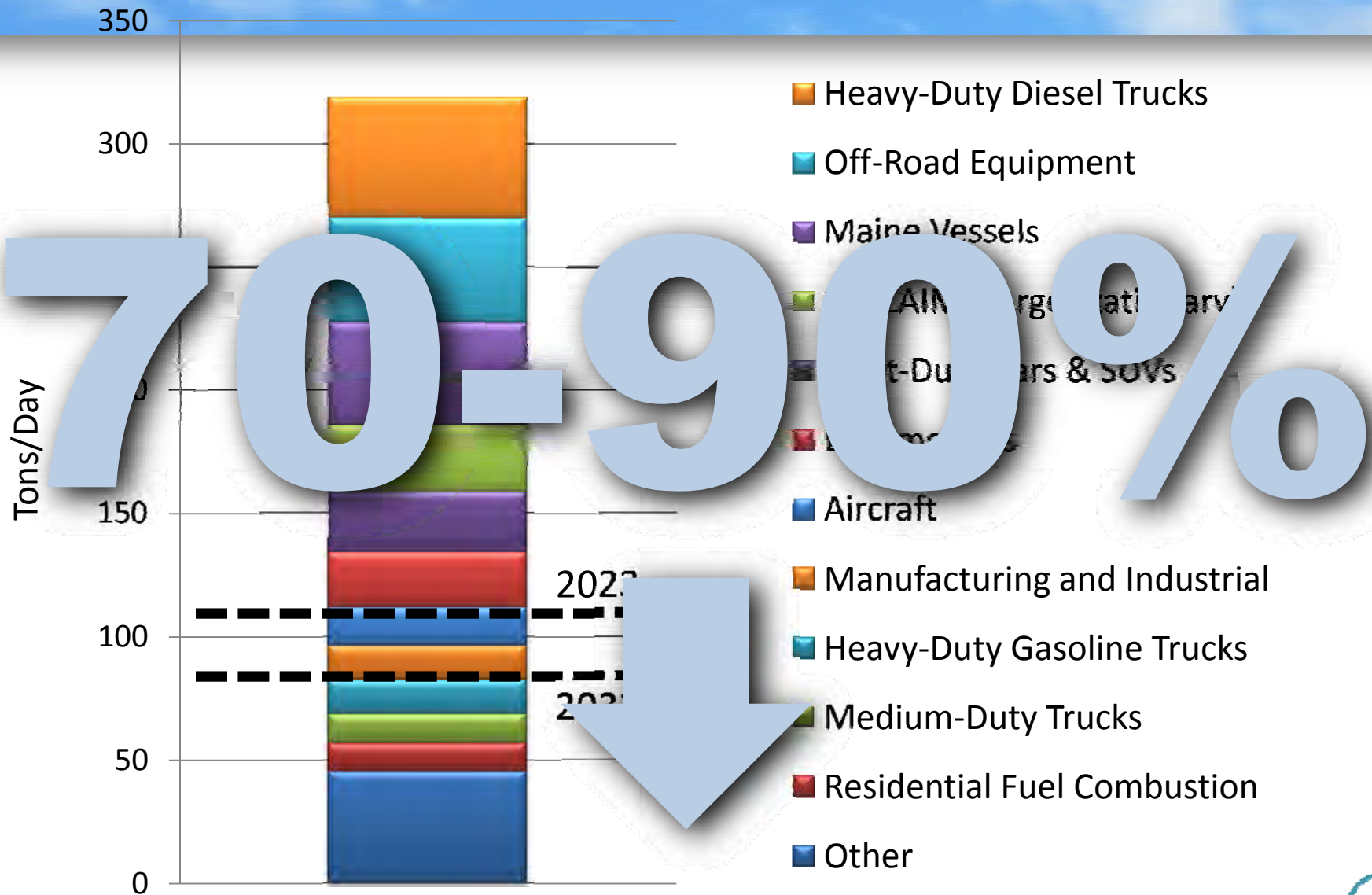
A study from China found that men living in polluted cities had lower fertility than their country cousins.

MEN, TAKE HEED: living in the city could be harming your fertility.

That is the finding of a recent [study](#) published in the journal *Environmental Pollution*, which analysed semen samples from more than 1,300 men in China.



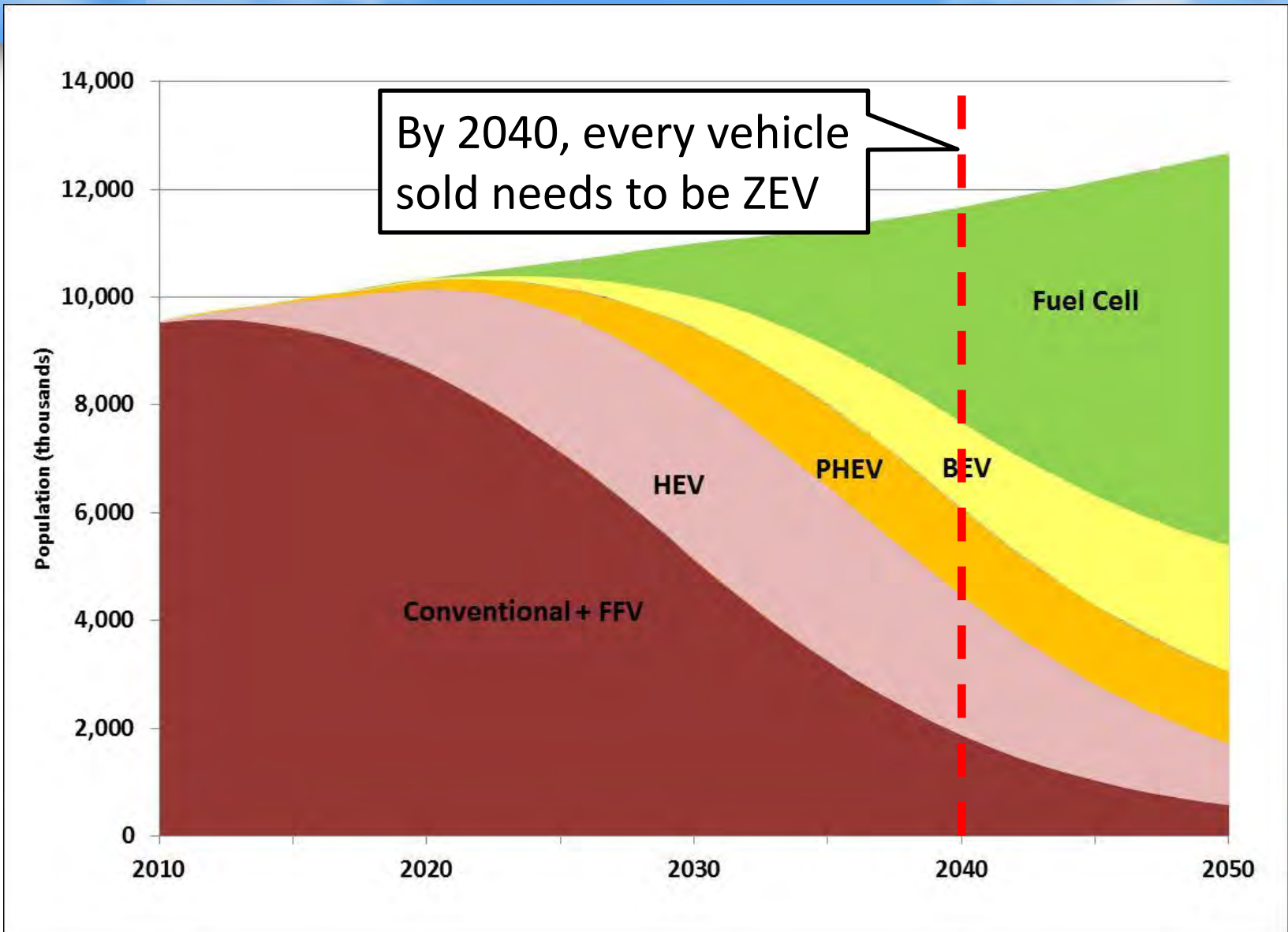
Top NOx Sources in the Region



In 2023 with all regulations implemented



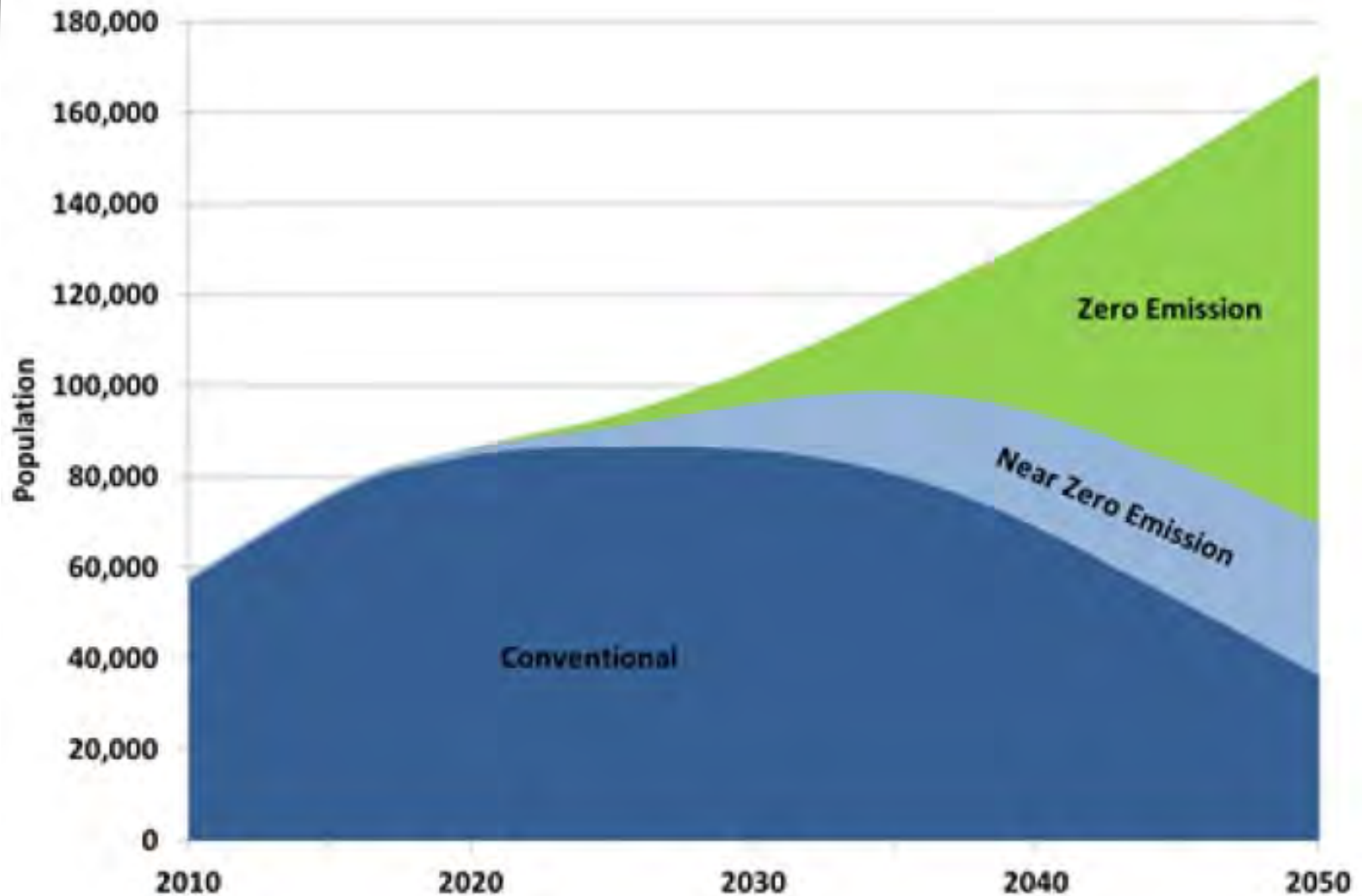
Vision for Clean Air Light-Duty Scenario

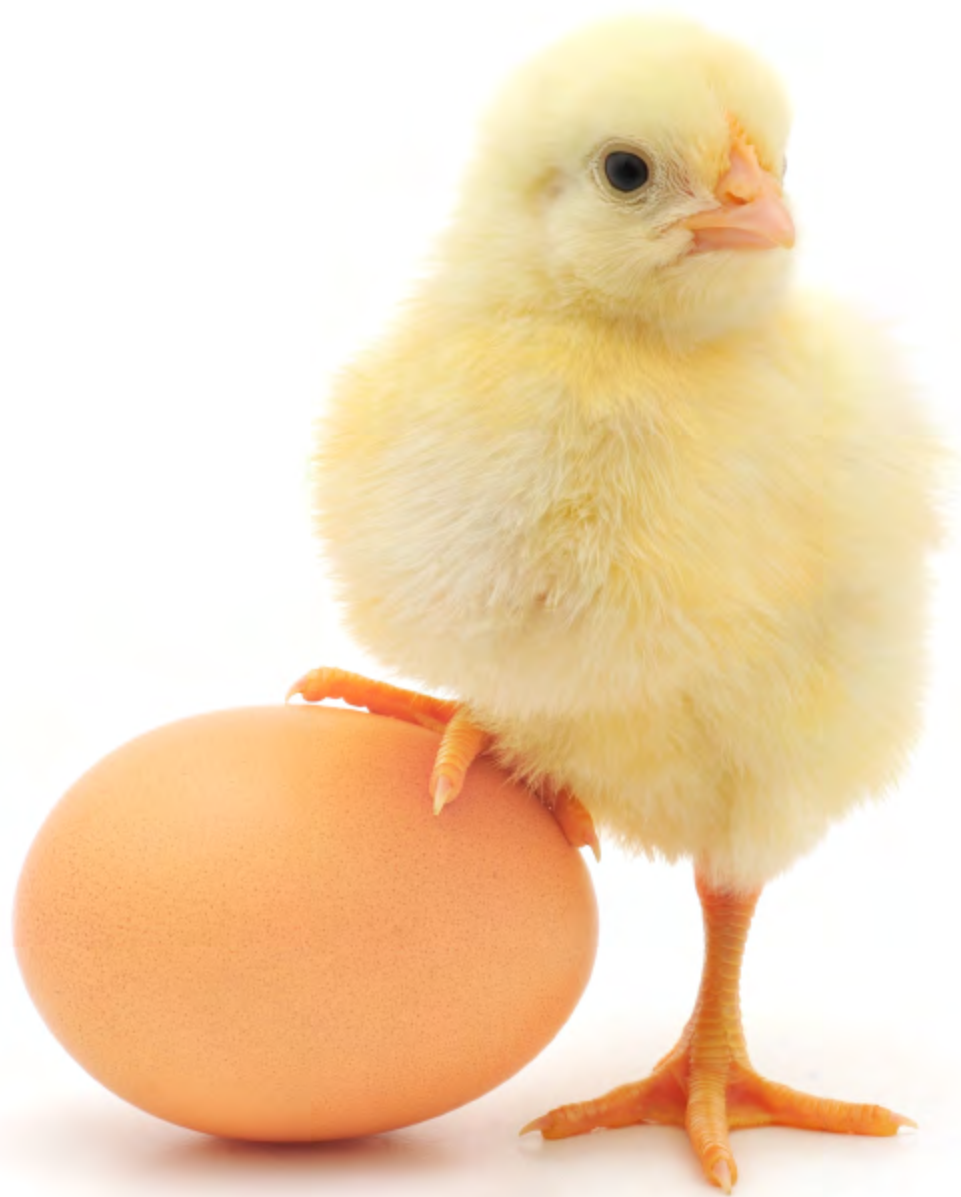


Vision for Clean Air, Figure 11 (June 27, 2012)



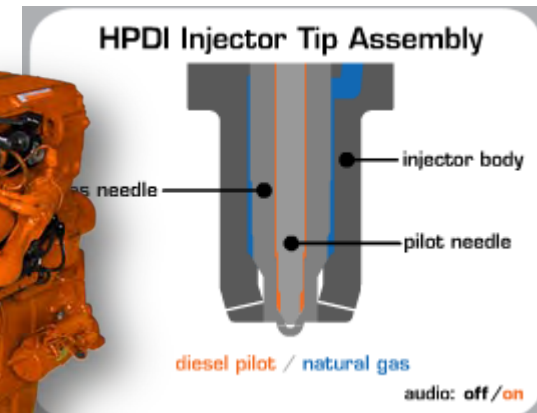
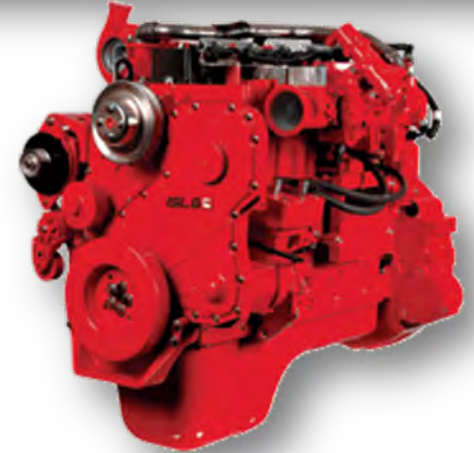
Vision for Clean Air Heavy-Duty Scenario





Past NG Engine Development

- Cummins Westport 8.9L ISL-G
 - NGNGV2 Initiated ~2001
 - Certified in 2007
- Westport Innovations 15L ISX (HPDI)
 - Development in 2004
 - Certified in 2010



Local Success Stories

- LAMTA – Transit Buses
 - California's largest transit agency (3rd largest in Nation)
 - 100% CNG in January 2011
- School Buses
 - Replaced close to 1,000 pre-1987 buses with new CNG buses since 2001
 - Largest number of replacements in CA (\$150 million)
- Refuse Haulers
 - 34% alternative fuel
 - Waste Management has largest NG fleet in the nation



Medium & Heavy-Duty Technologies

- Hybrid trucks – 11 OEMs and 134 Models
- Hybrids with All Electric Range

- Volvo
- Capstone/Kenworth

- Battery Electric & Fuel Cell

- Transpower
- Balqon
- US Hybrids
- Vision



Zero & Near-Zero Emissions Freight Movement

- Wayside power, e.g., catenary
 - All-electric range in corridors
 - Flexible off-corridor routes
 - Already demonstrated in Germany
- Initial demonstration near the Ports to intermodal facility
- Regional implications



2012 RTP: Warehouse infrastructure



Heavy-duty Natural Gas Applications

- Economics driving turnover to NG
- Domestic fuel supply
- Develop power-plant equivalent tailpipe emission technologies
 - “Electric Vehicle Equivalent”
- High-horsepower engines

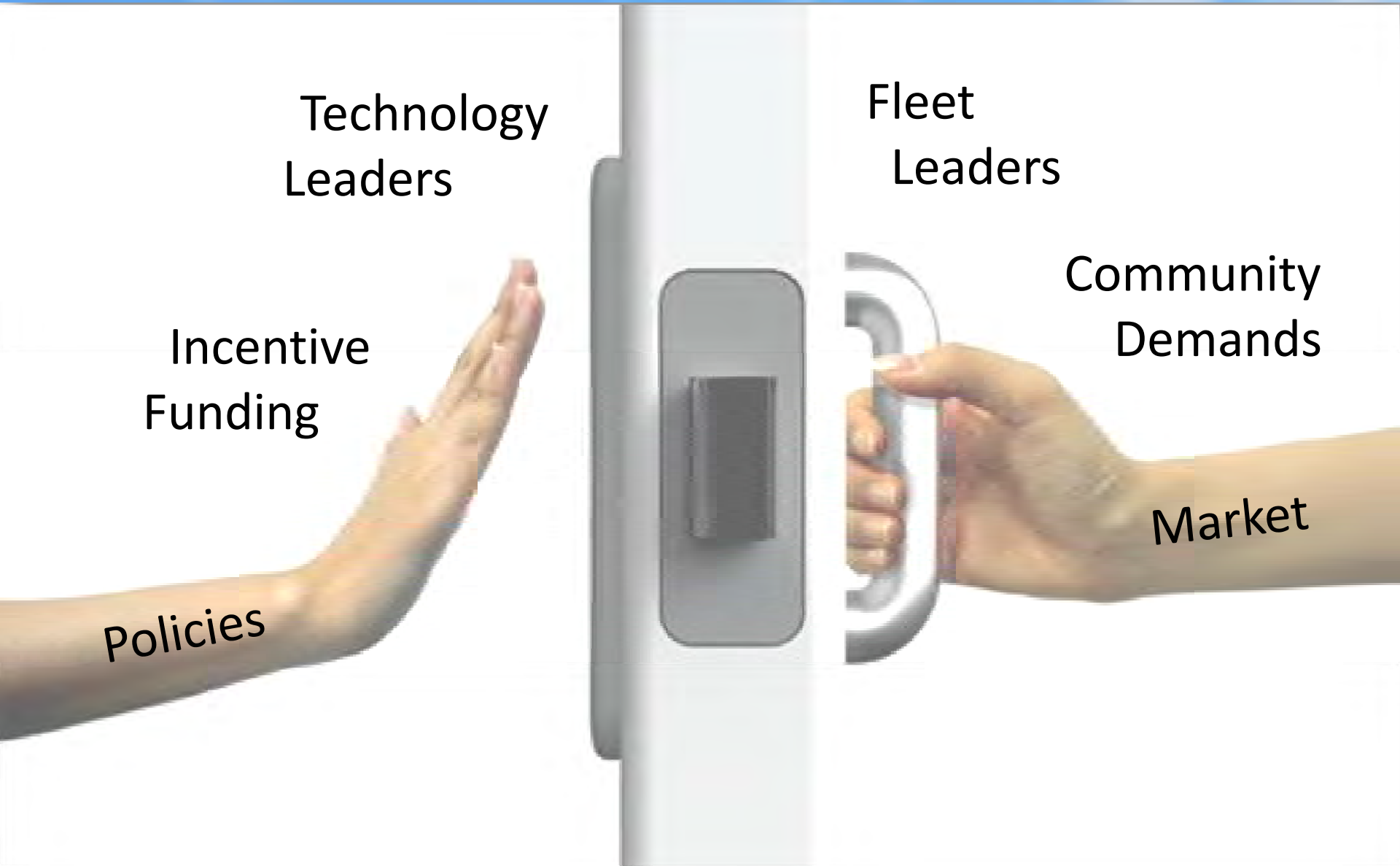


Next Generation NG Engines

- Targeting order of magnitude NOx reduction – 0.02 g/bhp-hr
- Awarded October 2013, \$3.5M each
 - Cummins – 15L
 - Cummins Westport – 8.9L
 - Partnering with CEC and SoCalGas
 - Both using TWC and combustion mods



Push-Pull Mechanisms



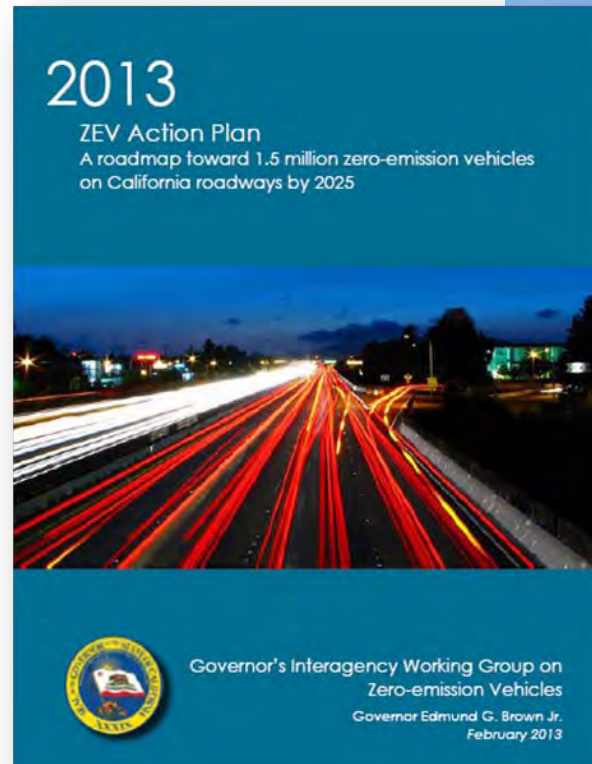
Lessons Learned

- CARB Regulations
 - Hybrid Voucher Incentive Program, CVRP
 - Cash buydown
- Port Clean Truck Program
 - Proposition 1B buydown
 - Additional DOE, EPA and CEC funding
- Goods Movement in Regional Transportation Plan, I710 Expansion, Vision exercise, ZEV Action Plan



What is needed?

- Fostering infrastructure
- Policy and incentive certainty
- Collaboration
- Leadership



Thank You



South Coast
Air Quality Management District

Cleaning the air that we breathe...



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